

METHOD FOR PLATING COPPER CONDUCTORS AND DEVICES FORMED

Abstract of the Disclosure

A method for plating copper conductors on an electronic substrate and devices formed are disclosed. In the method, an electroplating copper bath that is filled with an electroplating solution kept at a temperature between about 0°C and about 18°C is first provided. A copper layer on the electronic substrate immersed in the electroplating solution is then plated either in a single step or in a dual-step deposition process. The dual-step deposition process is more suitable for depositing copper conductors in features that have large aspect ratios, such as a via hole in a dual damascene structure having an aspect ratio of diameter/depth of more than $\frac{1}{3}$ or as high as 1/10. Various electroplating parameters are utilized to provide a short resistance transient in either the single step deposition or the dual-step deposition process. These parameters include the bath temperature, the bath agitation, the additive concentration in the plating bath, the plating current density utilized, the deposition rate of the copper film and the total thickness of the copper film deposited.